Preferred for a reason

Leksell Gamma Knife® Perfexion™

Elekta
Why do medical professionals and patients prefer Gamma Knife Surgery?

More than 80,000 patients undergo Leksell Gamma Knife® radiosurgery every year. Pioneering knowledge, insight from physicians, meticulous research and cutting-edge technology—this is Leksell Gamma Knife surgery.

No matter how complex or intricate the clinical challenge, Gamma Knife surgery delivers the highest levels of physician and patient satisfaction. This makes it the treatment of choice at leading hospitals and clinics around the world.
Elekta perfects the art and science of stereotactic radiosurgery

Pioneered by Elekta, stereotactic radiosurgery involves delivering a single, high dose of radiation to a small and critically located target in the brain. This principle defines Gamma Knife surgery and it has dramatically widened treatment possibilities for physicians and patients.

Exceeding expectations
Leksell Gamma Knife is specifically designed for non-invasive procedures. Gamma Knife surgery provides pinpoint accuracy, unmatched efficiency and outstanding results. Patients benefit from fast, painless treatment, often conducted in an outpatient surgical setting without the need for general anesthesia or even convalescence. Over 1 million patients have undergone Gamma Knife surgery.

Setting the standard for radiosurgery
This integrated system provides full cranial reach. The system is built to deliver outstanding patient and staff comfort and better dosimetry performance than any other radiosurgical system.

Leksell Gamma Knife Perfexion—the system that fuses the skills of the physician with the science of radiosurgery.
The ultimate cranial radiosurgical tool—Leksell Gamma Knife® Perfexion™

Leksell Gamma Knife is consistently regarded as the best non-invasive treatment for brain disorders. So how did we make the best even better? By listening to experts in radiosurgery and then creating Leksell Gamma Knife Perfexion.

One-button automation
The system offers physicians a fully automated, single push-button approach to operations that translates into dramatic time savings. The cutting-edge design radically expands treatment reach to cover a wider range of anatomical structures.

Full reproducibility
Leksell Gamma Knife Perfexion offers protocol reproducibility with full backward compatibility to existing Gamma Knife surgery protocols. That means building on the treatment experience of over 1.2 million patients and close to 3,000 peer-reviewed papers.

Robotic efficiency
With Leksell Gamma Knife Perfexion, the multiple helmets of the previous Leksell Gamma Knife models have been replaced by a single robotic system with three collimator sizes. Because the collimator size automatically changes according to the treatment plan, treatment times are radically reduced.

Improved workflow speeds radiosurgery
The system comes complete with Leksell GammaPlan®, the dedicated treatment planning system designed to take full advantage of the features and intelligence incorporated in Leksell Gamma Knife Perfexion.

Composite Shots enable sculpting the dose distribution, which is then delivered with the unmatched accuracy associated with Gamma Knife surgery.

Unrivalled radiation protection
Every feature of Leksell Gamma Knife Perfexion reflects patient and staff safety and comfort. The system provides radiation shielding that is up to 100 times better than alternative technologies.

Room radiation levels are low enough to allow for a window into the treatment room and the system can be accommodated within a normal-sized room.
Smooth and seamless treatment workflow

The ideal treatment procedure for physicians and patients is a single session that is swift, precise and elegant. This is where Gamma Knife surgery, together with the dedicated treatment planning system, excels. Each step in the process works to the highest possible standard of convenience and enables superior clinical efficiency.

Complete integration
The system digitally integrates diagnostic images, treatment planning and dose delivery into a seamless information flow. Finally, the procedure is implemented via a single push-button operation.

Highest comfort and safety
Patient comfort and well-being are priorities at every phase. The entire process is straightforward and the patient is usually ready to return to normal life the next day.

Workflow is so efficient that staff numbers are minimized while physicians’ valuable time is optimized.

Frame Attachment  Leksell® Stereotactic Frame is secured to the patient’s head throughout the entire treatment procedure to ensure maximum accuracy.

Improved workflow with Leksell Gamma Knife Perfexion

- 100% uptime (98% uptime guaranteed)
- Single run, one push-button for 99% of all cases
- Two hours saved per patient compared to previous systems
- Treatment planning done twice as fast

Data based on a study of 99 patients, conducted at Hospital La Timone, Marseille, France (July-December 2006) and experience at Cromwell Hospital, London, UK.

Diagnosis

Imaging  Images taken immediately before the treatment determine the precise shape, size and location of the target.
Gamma Knife surgery—preferred for a reason

With very few exceptions, Gamma Knife surgery is given on a single occasion and without general anesthesia. After Gamma Knife surgery the patient normally leaves the hospital on the same day or the day after, making it a very cost-effective alternative to open surgery.

During the procedure, 192 radiation beams from cobalt-60 sources converge with high accuracy on the target. Each individual beam has low intensity and therefore does not affect the tissue it passes through on its way to the target. The beams converge in an isocenter where the cumulative radiation intensity becomes extremely high.

By moving the patient’s head in relation to the beams’ isocenter, the radiation dose can be optimized in relation to the shape and size of the target. The extreme precision of Leksell Gamma Knife—better than 0.5 mm—makes it possible to administer a high radiation dose to the lesion with minimal risk of damaging healthy tissue.

Treatment planning  Images are used to create a tailor-made treatment plan to enable an optimal radiation dose to the target. The treatment plan is then transferred to the Gamma Knife system.

Treatment  Targets are automatically irradiated according to the plan. Throughout the treatment procedure the patient is monitored via the intercom system.

Follow-up  The effect of radiosurgery takes place over time.
Reaching new heights of excellence

Over 70 years ago, Professor Lars Leksell discovered that by minimizing surgical intervention in the skull, the mortality rate could be reduced along with the trauma to the patient.

This concept led to the birth of minimally and non-invasive neurosurgery and the inception of Elekta.

Setting the gold standard

It was Professor Leksell who invented the stereotactic frame so fundamental to Gamma Knife surgery. The stereotactic concept of directing x-ray beams into the brain was used surgically for the first time in 1951. This marks the birth of stereotactic radiosurgery—and with it, Leksell Gamma Knife.

In the 1980s, the first commercial deliveries of Leksell Gamma Knife systems were made. The unsurpassed clinical effectiveness of the treatments conducted saw a dramatic increase in the number of publications. Leksell Gamma Knife soon became the worldwide gold standard for stereotactic brain surgery.

The number of patients to undergo Gamma Knife surgery has risen from about 7,000 patients in 1991 to 1.1 million by 2018. Correspondingly, the number of units installed globally over the last fifteen years has gone from 20 units in 1991, to over 300 units by 2018.

Solutions for tomorrow

Elekta is continually evolving innovative solutions that redefine the neurological landscape.

Leksell Gamma Knife Perfexion is built with the technology to advance frontiers and deliver on the vision that guided Lars Leksell—to deliver highly effective and efficient treatment, at reasonable cost, with as little trauma to the patient as possible.

1949 Introduction of Leksell Stereotactic System
1968 First Leksell Gamma Knife prototype for clinical research
1986 First commercially dedicated Leksell Gamma Knife
1989 Leksell Gamma Knife Society formed
1999 Introduction of Leksell Gamma Knife C with Automatic Positioning System™ (APS)
2006 Launch of the fifth generation—Leksell Gamma Knife Perfexion

The collimator design of Leksell Gamma Knife Perfexion enables fully automated treatment delivery.
The power of planning—Leksell GammaPlan®

The concept behind Leksell GammaPlan® is to enable the physician to tailor a conformal treatment plan for a specific medical condition.

Leksell GammaPlan has been developed in collaboration with the professionals who actually use the system. This explains why so much attention has been devoted to ensuring true user-friendliness, speed and precision.

Software modules for easier planning
Using the latest technology, Gamma Knife software modules such as Inverse Planning, Re-Treatment and DICOM-RT bring more power to your planning. This opens the platform for future upgrades, while delivering on daily clinical needs for improved workflow, cost efficiency and treatment quality.

Rapid, precise planning
The system makes it possible to plan treatment of one or several lesions with as many isocenters as clinically deemed optimal. This is performed in a matter of minutes. Irradiation of the lesions is then delivered with superior conformity and selectivity.

Optimal tool for planning multiple targets
Based on a new algorithm, using automatic balancing of the radiation dose, the treatment planning of multiple brain metastases is now as easy as planning for a single target.

Composite Shots and Dynamic Shaping
The unique collimator design featured in Leksell Gamma Knife Perfexion enables the most complicated tumors to be treated with absolute precision.

Composite Shots enable dose sculpting of complex structures. And, Dynamic Shaping protects critical anatomical structures in the vicinity of the target, thereby enabling a higher dose to the target.

Regardless of complexity
Leksell GammaPlan ensures the most precise and effective treatment is delivered, regardless of the number and complexity of the targets—so physicians can achieve new heights of patient success.
The sophisticated sector mechanism enables automatic collimator configuration within seconds and is designed to deliver high serviceability.

The collimator system consists of 192 cobalt 60 sources, divided into 8 sectors that can be individually positioned to any of 4 states: 4 mm, 8 mm, 16 mm or off. During treatment, these sources are positioned via the sector mechanism to generate the desired radiation beam, and enable treatment of highly complex structures.

The unique collimator design offers full cranial reach, enabling treatment of a wide range of anatomical structures.

A series of interlocks are incorporated for a well-integrated system with enhanced safety features.

Radiation shielding levels are the market’s best, up to 100 times better than alternative technologies. Overall radiation levels are low enough to permit a window in the treatment room.

The system is developed with reliable, state-of-the-art industrial components for absolute stability, safety and precision.

The couch can easily be adjusted for optimal patient comfort.

The patient positioning system is built to be highly robust, accurate and dependable. It moves the patient into the correct position according to the beams’ isocenter, thereby optimizing the radiation dose to the target.

The single-button approach enables fast and flexible surgical procedures, saving time and resources even as patients are effectively treated.

A user-friendly, intuitive Graphical User Interface provides up-to-date information on your patient’s ID, treatment status and operational conditions.
There is no other system capable of delivering the standards of accuracy achieved by Leksell Gamma Knife—a tested, proven fact.

**Elekta guarantees 0.50 mm**

In intracranial radiosurgery, clinical accuracy is the sum of the accuracy contributions that make up the entire treatment procedure—imaging, dose planning, patient positioning, radiological and mechanical accuracy.

Elekta guarantees that Leksell Gamma Knife systems will perform with a total radiological accuracy of 0.50 mm when having a valid service agreement. A study of 189 installed systems, based on 332 commissioning protocols, proved an average level of radiological accuracy of 0.15 mm.

**The only true stereotactic system**

Only Leksell Gamma Knife offers a true stereotactic system from the ground up, to facilitate precision with their sheer stability and robustness. Leksell® Coordinate Frame immobilizes the patient’s head throughout the procedure.

A common definition of accuracy is “the measure of the difference between the desired or planned outcome and a measurable outcome.”

**Sub-millimeter accuracy results in clinical benefits**

- Improved quality of life compared to surgery
  - Less trauma
  - Faster recovery
  - Shorter hospital stays
  - Fewer surgery-related complications

- **Improved clinical outcome**
  - Optimal dose to the target
  - Minimum dose exposure to surrounding tissue

The entire system comprises the least possible number of moveable components in order to deliver unsurpassed accuracy.

From the very beginning, Elekta has been uncompromising in the levels of accuracy defined and delivered by Leksell Gamma Knife. For the future, unmatched accuracy is assured by Leksell Gamma Knife Perfexion.
**Gamma Knife® surgery—based on clinical evidence**

In today’s cost-driven healthcare environment, it’s crucial to evaluate expensive technology investments on the basis of hard facts and proven results. This is particularly true when choosing the best care for patients suffering from serious neurological diseases and cancer. In these cases, radiosurgery with Leksell Gamma Knife offers a range of benefits and efficacies fully supported by years of evidence-based medicine.

**Proven and documented results**
Clinical results for Gamma Knife treatment have been extensively published in peer-reviewed journals, which cite significant increases in successful outcomes. Only Leksell Gamma Knife can show this long-term performance and how it combines cost-effectiveness with improved quality of life for patients in both curative and palliative care.

**Constantly evolving practice**
Gamma Knife surgery is constantly expanding, with ongoing research for new indications and the development of existing protocols. The design of Leksell Gamma Knife makes it especially suitable for treatment of multiple targets, which in most cases means brain metastases.

Over 400,000 patients have been treated for metastatic tumors with Leksell Gamma Knife systems since the first treatment in 1968. With extremely good tumor control rate, few side effects and the ability to treat multiple targets effectively, Gamma Knife surgery occupies a unique position in this field.

With all the clinical and management advantages of Gamma Knife surgery, it has become a preferred method in the care of metastatic disease.

The unique ability to treat multiple brain metastases provides new opportunities for the patient to prolong life and gain better quality of life.

And with greater awareness among patients, Gamma Knife surgery is increasingly being requested when it comes to treatment of the brain.

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**Metastatic tumors, cumulative patients treated worldwide**

The percentage of centers submitting their numbers each year has varied between 68–100% from 1968 to 2017. 1991 reflects cumulative numbers since 1968.
Playing a vital role in modern healthcare

With the increasing number of cancer incidence rates and an aging population, Gamma Knife surgery plays an important role in modern healthcare. Hospital management and medical staff choose Leksell Gamma Knife for its extreme accuracy, streamlined workflow and outstanding therapeutic response. It frees resources in the clinic, provides evidence-based medicine, and gives the clinic confidence and reliability.

Gamma Knife surgery helps reduce waiting lists for radiation therapy and neurosurgery clinics. It offers high quality care for disorders of the brain, and short treatment times with rapid patient recoveries mean lower costs for the healthcare system and society. Patients get back to work and normal life faster compared to convalescence after open surgery.

Several published studies demonstrate savings of more than 50% of direct costs associated with microsurgery. These gains are primarily due to the minimal need for hospitalization and intensive care, as well as the reduction of complications related to open surgery.

Another study shows that one Gamma Knife system can free up to 700 ICU beds per year.

Clinical need for more capacity

Taking the most common Gamma Knife surgery indications into account, 325 to 830 people per million are candidates for this treatment. This number will most certainly grow in the future. The number of cancer cases is predicted to increase by 50 percent—to 24.6 million new cases—by the year 2020. As 20–40% of all cancer patients develop brain metastases, Leksell Gamma Knife will definitely play an important role in future healthcare.
Flexibility and freedom of choice—a complete product family

Elekta is the world’s only radiosurgery solutions provider with a comprehensive range comprising systems, software and services.

These are the components necessary to build and support a stereotactic center of excellence with dedicated solutions for head and body. The breadth of Elekta’s portfolio allows a neurosurgery or radiation oncology center to develop a strong reputation based on exceptional patient care and profitable collaborations.

References


Each Gamma Knife user receives automatic membership to the prestigious Leksell Gamma Knife Society. Today, this society is an esteemed global network for sharing clinical experience, scientific research and knowledge.

Elekta works very closely with all users to understand their needs and learn from their findings. These insights are invaluable for the development of new products.

The successful evolution of Elekta’s solution developments over the years is a direct result of close collaboration with the members of the Leksell Gamma Knife Society.
From prompt, personalized service and support to innovative learning programs and customized consulting services, it’s all part of our forward-thinking commitment to provide you the best customer care—so you can make the most of your Elekta technology investment throughout its lifecycle.

We offer comprehensive learning opportunities in a variety of formats, enabling your team to optimize your technology capabilities, expanding when and how your learning curve requires it.

Elekta Care’s secure online customer portal, Elekta Care Community, is accessible 24/7, bringing the power of Elekta Care’s dedicated support organization straight to you.

Clinical applications, technical or physics support is just a connection away and is backed by a global support network of 165 remote support specialists and more than 650 field service engineers.

Rest assured, you’ve got Elekta Care.

Elekta Care—our commitment to providing the best customer care

Elekta Care supports you from start-up through your product’s lifecycle with comprehensive options from education, training and upgrades to solutions allowing you the highest uptime and improved operational efficiency.
For almost five decades, Elekta has been a leader in precision radiation medicine.

Our nearly 4,000 employees worldwide are committed to ensuring everyone in the world with cancer has access to—and benefits from—more precise, personalized radiotherapy treatments.